AN INVESTIGATION OF THE RESCUE PERSONALITY IN FIREFIGHTER RECRUITS

by

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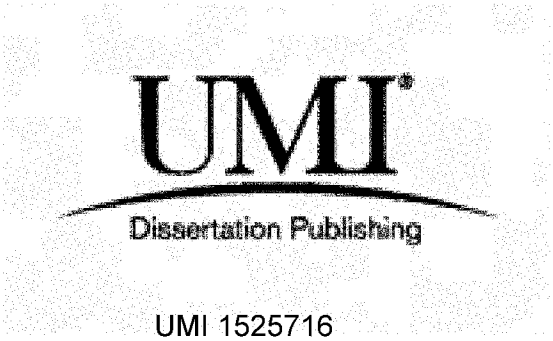

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Abstract

The purpose of this study was to investigate the predispositional nature of the "rescue personality" and the mental health of firefighter recruits. This study compared responses to a written set of personality and mental health measures between firefighter recruits and community controls—individually matched based on age, gender, ethnicity, education, and marital status. Data analysis involved statistical one-way analyses of variance in complement with epidemiological paired odds ratio calculations. The results indicated that firefighter recruits are less open to experience, less Type A, and less likely to report posttraumatic stress symptomatology characteristic of PTSD than controls. Recruits do not differ from controls in regards to any subscale of the SCL-90-R, neuroticism, extraversion, agreeableness, conscientiousness, sensation seeking, proactive coping, emotional intelligence, or satisfaction with life. Based on these findings, there is insufficient evidence to support the "rescue personality" as a predispositional factor to joining the firefighting service.

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Acknowledgement

First of all, I would like to thank my supervisor Dr. Shannon Wagner for the amazing support she provided throughout my graduate studies. She allowed me the opportunity to work through problems on my own, but was always available if I needed the extra help. This has been a very fulfilling process and I cannot imagine doing it again with a different supervisor.

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Literature Review

The current study is an investigation of the personality and mental health of firefighter recruits. As such, this chapter is intended to provide an overview of the literature pertaining to Posttraumatic Stress Disorder (PTSD) and the personality factors associated with its increased risk. Beginning with a description of the models of stress, this chapter leads into a general discussion of critical incidents, the diagnosis of PTSD, its prevalence in the community, and its associated risk factors. The focus is then placed on the firefighting community with a discussion of PTSD rates among firefighters, firefighter specific PTSD risk factors, and the personality factors that may predispose firefighters to increased PTSD risk. This then leads into a discussion of personality models and a review of the current literature investigating the personality of firefighter recruits. Finally, this chapter will conclude with an overview of the treatments available to PTSD suffers, including psychopharmacological and non-psychopharmacological treatments.

Models of Stress

The concept of stress is often referred to colloquially during casual conversation. A person might say that they are "stressed" or that something is causing them "stress," which conceptualizes stress as a personal state or emotion. However, this colloquial use of 'stress' is more likely referring to the emotional response to a stressor, rather than to stress on its own (Keil, 2004). Furthermore, stress is often described as a negative concept resulting in social and biological dysfunction. For this reason, conversational use of the term 'stress' serves as a metaphor for perceived hardship or as a way to discuss difficult aspects of life without explicitly stating the issues that one is facing. The pervasive colloquial use of 'stress' in conversation leads

to it being used in place of describing a vast array of hardships (Keil, 2004), ranging from a minor delay in schedule to a life-threatening illness or death of a family member.

The colloquial use of 'stress' in conversation may convey a general understanding of the emotional response experienced by the speaker, however, many complex theoretical models exist to better understand the body's physiological and psychological response to a stressor. For the purposes of this review, Lazarus's Transactional Stress Theory (Lazarus, 1974) and Selye's General Adaptation Syndrome (Selye, 1950) are reviewed based on their readily available descriptions and acceptance in the literature.

Transactional Stress Theory. In the 1970s, Lazarus and colleagues worked to better describe the interaction between people and their environment in relation to stress (Vollrath, 2001). From this work, they developed the Transactional Stress Theory (TST) in which a transaction is used to describe the previously mentioned interactions and relationships between a person and their environment. In this model of stress, once an environmental factor, or stressor, is perceived as stressful, coping mechanisms are involved in managing the response to the stressful stimuli. It is the effectiveness of these coping strategies, rather than the duration or frequency of the stressor, that determines how resilient a person will be toward the stressor and how they will subsequently perceive the severity of future stressors (Vollrath, 2001). Building further on this model, numerous personality characteristics have been implicated as predictors of resilience, effective coping, and positive appraisal, including hardiness, optimism, self-efficacy, and sense of coherence (Vollrath, 2001). Although these personality factors are relatively new concepts in the field of stress and stress management, they are a strong area of interest for researchers investigating stress in emergency personnel, including firefighters.

General Adaptation Syndrome. The person/environment factors previously mentioned are a very important component when understanding stress. However, it is also important to consider the biological component of the stress reaction. From research conducted in rat models, specific areas of the brain have been associated with the body's reaction to stressful stimuli. These areas are involved in the hypothalamic pituitary adrenocortical (HPA) axis and the sympathetic adrenomedullary (SAM) system (Koolhaas et al., 2011). These two systems can be considered "master systems" in that they are tightly integrated communication systems that work to coordinate cells, tissues, and organs with stimuli from the external environment. Higher activation of the HPA axis and SAM system leads to increased metabolic and cardiovascular capacity, which allows the body to respond to stressful stimuli—as most commonly noted in the fight-or-flight response (Koolhaas et al., 2011). These systems are also intrinsically linked with the body's circadian rhythms, which can be disrupted by stressors. Disruptions of the body's circadian rhythms, such as sleep patterns, can also leave the individual more susceptible to maladapted coping when a stressor is applied (Selye, 1950).

The function of the HPA axis and SAM system are an integral part of Selye's General Adaptation Syndrome (GAS) (Koolhaas et al., 2011). As the body generally tends toward homeostasis through adjustment of physiologic processes termed allostasis, any threat to the body's complex state of homeostasis, such as the previously mentioned environmental stressor, is met by a response from the HPA axis and SAM systems. This reaction is termed the Alarm stage under the GAS, and HPA and SAM activation increases metabolic load to help compensate for the effect of the stressor. This HPA and SAM activation continues through the Resistance stage toward the point at which the body cannot continue compensating for the effects of the stressor. If the stressor has been eliminated or has been overcome, the body enters a Recovery

stage where homeostasis is gradually achieved once again. However, if the body cannot successfully cope with the stressor, the alternative third stage of Exhaustion is entered, during which the body's resources are depleted and homeostasis cannot be achieved. If the Exhaustion stage persists, cell necrosis can occur, causing ulcers, cardiovascular illness, depression, and other mental health issues (Koolhaas et al., 2011).

It should also be noted that the GAS does not just apply to 'bad' stressors and not all stressors should be considered detrimental to a person's health. If a stressor is slight, brief, and controlled, then the stressor could actually lead to the furthered emotional and intellectual development of the individual. This experience of 'good' stress was termed 'eustress' by Selye in 1976 to distinguish it from 'distress,' which is caused by stressors that overwhelm the body's coping mechanisms and lead to exhaustion (Selye, 1976). For example, using Selye's terms, eustress describes the stressful experience of preparing for a wedding or writing a graduate thesis, while distress describes the stressful experience of a death in the family or suffering a debilitating injury.

Contrasting the two theories. Lazarus, through the Transactional Stress Theory, and Selye, through the General Adaptation Syndrome, developed different models describing stress and how it impacts the body. However, these models share some important similarities. In both models, a stressor is an environmental factor and it is this stressor that elicits a coping response from the body. It is at this point where these models differ based on the disciplines in which their creators specialized. Following Lazarus's psychology roots, the TST describes coping in terms of psychological resilience that later incorporated aspects of personality (Vollrath, 2001), while Selye's endocrinology background favoured a description of coping in terms of biology.

As previously mentioned, Lazarus also claimed that the effectiveness of applied coping strategies is the strongest predictor of how strong resilience will be and how it will impact future appraisals (Vollrath, 2001). Contrary to this view, the GAS suggests that the frequency and severity of the stressor are the most important factors determining successful coping from a stressor. As such, an increase in frequency or severity of the stressor would lead to a stronger response by the HPA axis and SAM system, potentially leading to more rapid depletion of metabolic resources and a tendency toward transition into the Exhaustion stage (Koolhaas et al., 2011).

Critical Incidents and Traumatic Events Described

As mentioned previously in the discussion of eustress and distress, not all stressors are equal. Although anybody may experience distress in their lifetime, firefighters and other emergency services personnel are often exposed to extreme levels of distress in the form of critical incidents. A critical incident can be defined as any unplanned or unexpected event causing a strong and unpleasant emotional reaction resulting in an inability to perform adequately at the scene or afterward (Lewis, 2003). In many cases this general definition is adequate. However, it tends to ignore how common unexpected and unplanned calls are in the emergency services profession and how many of these events can be considered 'unpleasant'. For this reason, other definitions specifically reference atypical events or calls that would have the capacity to overwhelm the ability of workers to cope (Bounds, 2006), or an event that exposes the worker to personal injury, mission failure, or human error (Harris, Baloglu, & Stacks, 2002). These critical incidents could also be the result of response to multiple different situations in a short period of time, events that attract large media attention, or contact with dead or severely injured victims (Harris et al., 2002).

The term 'critical incident' is often used when specifying traumatic exposures faced by emergency personnel. As a method of differentiation between civilians and emergency personnel, some literature utilizes the term 'traumatic stress' or 'traumatic event' when referring to traumatic exposures faced by the general public (Lewis, 2003). The term 'traumatic event' can then be used to encompass an even wider variety of experienced events including, but not limited to: assault, terrorist attack, torture, kidnapping, natural or manmade disasters, and severe automobile accidents. Witnessing events such as serious injury or death, or a dead body or body parts; and events experienced by others such as learning of the unexpected death or serious illness of a loved one, are also included when referring to traumatic events (American Psychiatric Association (APA), 2000).

Exposure to critical incidents or traumatic events often results in a stress reaction termed 'critical incident stress.' Depending on the intensity and persistence of the event, and personal resilience to the extreme stressor, this critical incident stress can progress to more severe mental health conditions such as Acute Stress Disorder and Posttraumatic Stress Disorder.

Posttraumatic Stress Disorder

Posttraumatic Stress Disorder (PTSD) is a condition that may follow exposure to a traumatic event or critical incident, such as a life-threatening situation or serious injury resulting in a sense of horror, fear, or helplessness (Chiu et al., 2011; Heinrichs et al., 2005). Symptoms of PTSD include reliving the event, having trouble remembering important details about the event, avoiding reminders of the event, loss of interest in previously enjoyable activities, feelings of indifference, hyperarousal, and irritability (APA, 2000; Bryant, 2007; Chiu et al., 2011; Haslam & Mallon, 2003). These symptoms usually begin within three months of the traumatic exposure, with approximately half of cases recovering in the following three months. However, it is not

uncommon for these symptoms to develop after a delay of months, or to continue for longer than 12 months after trauma. It is also possible that these symptoms could dissipate and reappear multiple times over the course of recovery (APA, 2000).

Diagnosing Posttraumatic Stress Disorder. The Diagnostic and Statistical Manual 5 (DSM-5) is the most current and widespread tool used for the diagnosis of PTSD (Regehr, Hill, Knott, & Sault, 2003). In order to be diagnosed with PTSD using the DSM-5, eight criteria must be met. The most important of these criteria are that the person must have experienced or witnessed a traumatic event, learned of a traumatic event that has been experienced by a close family member, or has been repeatedly or extremely exposed to the adverse details of a traumatic event (APA, 2013).

The DSM-5 then categorizes the previously described symptoms of PTSD under four criteria: persistence of intrusive symptoms, avoidance of reminders of the trauma, negative alterations in mood and cognitions, and alterations in arousal and reactivity associated with the traumatic event (APA, 2013). Intrusive symptoms include the recurrence of distressing memories, dreams, or flashbacks associated with the traumatic event, and distress at exposure to internal or external cues that may resemble an aspect of the traumatic event (APA, 2013). Avoidance of reminders is characterized by taking extreme actions to avoid distressing thoughts, memories, or feelings about the event; or to avoid external reminders of the event, such as situations, places, or people that may elicit distressing memories, thoughts or feelings about the traumatic event. Negative alterations in mood and cognitions include an inability to remember aspects of the event, negative beliefs or expectations about oneself or blaming oneself or others for the event, diminished interest in activities once found enjoyable or detachment from others, or persistent negative emotions and inability to experience positive emotions (APA, 2013).

Finally, alterations in arousal and reactivity are characterized by hypervigilance, exaggerated startle response, problems concentrating or sleeping, self-destructive behaviour, and irritability and an inability to control anger (APA, 2013).

The last three criteria state that the duration of the symptomatic criteria must exceed one month, that the disturbance significantly impairs the person's ability to function socially or occupationally, and that the disturbance is not related to substance abuse or another medical condition (APA, 2000). If the duration of the symptomatic criteria is less than one month, the person is most likely to be diagnosed as suffering from Acute Stress Disorder (ASD). However, any diagnosis of ASD can be revised to PTSD if the symptoms persist longer than one month (APA, 2013).

Along with the diagnostic criteria, the DSM-5 also explains that PTSD may have delayed expression, and/or dissociative symptoms. The requirements for delayed expression are met when the diagnostic criteria for PTSD are not established until at least six months after the traumatic event, while the specification of PTSD with dissociative symptoms is met when the individual experiences persistent or recurrent depersonalization, a feeling of being detached from one's own body or mental process, or derealization, a feeling that one's surroundings are not part of reality (APA, 2013).

Although not distinguished in the DSM-5, PTSD can be further differentiated into Primary and Secondary PTSD. The differentiation between Primary and Secondary PTSD is determined depending on the type of exposure to the trauma. Direct exposure to the traumatic event, as a victim, results in Primary PTSD, while indirect exposure, as an observer of a trauma or close family member or friend of a traumatized individual, results in Secondary PTSD (Wagner, Heinrichs, & Ehlert, 1998). The concept of Secondary PTSD is based on the concept of

secondary stress, that is, the stress resulting from indirectly experiencing a traumatizing event experienced by a significant other or the stress resulting from helping or wanting to help a person who has been traumatized (Wagner et al., 1998). For counsellors working with clients suffering from PTSD, secondary traumatic stress (STS), also known as compassion fatigue, can result from hearing emotionally shocking information from their clients. Similarly, vicarious traumatization (VT) can occur among counsellors who experience an empathetic engagement with their traumatized client, resulting in disruptions to the counsellors' perceptions of self-meaning and hope (Canfield, 2008).

Prevalence of PTSD and traumatic exposure in the general population. Along with the DSM-5, other tools are commonly used in the diagnosis of PTSD, such as the Impact of Event Scale (Regehr et al., 2003). However, the existence of multiple diagnostic tools creates difficulties when comparing the rates of PTSD between populations, as individual rates may be determined using different tools. Additionally, the subjective nature of these diagnostic tools further complicates comparisons, as standardized objective measures are not currently available (Regehr et al., 2003).

Considering the aforementioned challenges associated with using multiple tools in the diagnosis of PTSD, it is difficult to determine accurate prevalence estimates of PTSD in the general population. The American Psychological Association estimates the lifetime prevalence of PTSD (the proportion of people who have or had PTSD at least once in their lifetime) to be approximately 8% in the adult population of the United States, with higher rates reported among individuals at higher risk (APA, 2000). This figure is consistent with another finding in the National Comorbidity Survey, using the DSM-III, that lifetime prevalence of PTSD in the United States is 7.8% (Kessler, Sonnega, Bromet, Hughes, & Neilson, 1995). However, replication of

this study using DSM-IV criteria resulted in a lower rate of 6.8% (Kessler et al., 2005). Despite these relatively high lifetime prevalence rates for PTSD, American point prevalence rates (the proportion of people with PTSD at the time of study) could be as low as 1.9% (Carey, Al-Zaiti, Dean, Sessanna, & Finnell, 2011).

In countries outside of the United States there are even less data available related to the prevalence of PTSD (APA, 2000). Synthesis of the few available studies produces a world-wide prevalence of PTSD ranging from 1.3 to 37.4% (Van Ameringen, Mancini, Patterson, & Boyle, 2008), while lifetime prevalence of PTSD in Canada is an estimated 9.2% based on a modified version of the Composite International Diagnostic Interview (CIDI) PTSD module. The point prevalence of PTSD in Canada, using the same criteria, was approximately 2.4% in a one month period during the summer of 2002 (Van Ameringen et al., 2008).

It should also be noted that very few people who are exposed to a traumatic event actually develop PTSD. In the United States and Canada, an estimated 89.6% and 76% of citizens, respectively, are exposed to at least one traumatic event in their lifetime (Breslau et al., 1998; Van Ameringen et al., 2008). Needless to say, with the Canadian lifetime prevalence of PTSD only being 9.2%, many people who are exposed to a traumatic event do not go on to develop PTSD.

Risk factors associated with Posttraumatic Stress Disorder. There are many factors associated with an increased risk of developing PTSD. When considering the Transactional Stress Theory (TST) and General Adaptation Syndrome (GAS), there are noticeable differences in theoretical risk factors that would predispose a person to increased stress. The TST tends to attribute specific personality factors and strong coping skills to an increased resilience to stress (Vollrath, 2001), while the GAS places more emphasis on the duration and intensity of exposure

to the stressor when determining the stress response (Koolhaas et al., 2011). In the case of PTSD, it seems that both personality and coping factors, and intensity and duration of exposure to the stressor, are factors in the likelihood of developing PTSD.

When consulting the DSM-IV-Text Revision (TR), the severity, duration, and proximity of the person to the traumatic event are the strongest factors related to risk of developing PTSD. It is also stated that even in the absence of any other predisposing conditions, an extremely traumatic exposure is likely to result in the development of PTSD (APA, 2000). As such, an American study found that the traumatic exposures to torture/kidnapping, rape, and other sexual assaults have some of the highest conditional risks for the later development of PTSD (53.8%, 49%, and 23.7% respectively) (Breslau et al., 1998). These findings were also supported by a Canadian study that found assaultive violence to be the most common cause of PTSD in 43.1% of all cases (Van Ameringen et al., 2008).

Although the extremely traumatic exposures related to assaultive violence are the most likely to result in the development of PTSD, not all extremely traumatic exposures are physical in nature. In fact, the most common single exposure resulting in PTSD is the sudden and unexpected death of a loved one, which constitutes approximately 31% of PTSD cases (Breslau et al., 1998; Van Ameringen et al., 2008). The rate of PTSD caused by the unexpected death of loved ones underscores how severe emotional trauma can also result in PTSD.

While not considered to be as important compared to the severity and duration of exposure in the development of PTSD, the DSM-IV-TR does acknowledge that other factors, such as social support, family history, pre-existing mental disorders, childhood experiences, and personality variables, may be associated with increased risk of developing PTSD after a traumatic exposure (APA, 2000). Emerging research is also implicating other non-exposure

related factors in the increased risk of developing PTSD. For example, having a prior psychiatric disorder or a tendency toward negative personality traits (including neuroticism, hostility, dissociation, emotional dysregulation, and low-self efficacy) increase risk (Heinrichs et al., 2005; Smith et al., 2011; Van Ameringen et al., 2008), while increased social support decreases risk (Smith et al., 2011). One study also reports that negative self-appraisals could be associated with increased risk of developing PTSD because the negative self-image could be exacerbated by the traumatic exposure (Bryant & Guthrie, 2007). Other possible factors associated with increased risk of developing PTSD are a previous experience of childhood abuse, an early age of trauma occurrence, being separated widowed or divorced, and female gender (Breslau et al., 1998; Heinrichs et al., 2005; Van Ameringen et al., 2008).

Firefighters: A High Risk Population

The firefighting profession is held in high regard in modern culture. These protectors of society are often the first responders to countless different emergency situations. Unfortunately, the severity of these situations is often not predictable due to the range of possible emergencies that a firefighter can be called to, including residential and commercial fires, medical emergencies, explosions, hazardous material spills, and even large-scale community disasters (Corneil, Beaton, Murphy, Johnson, & Pike, 1999). This variety of emergencies requiring response results in high-stress and high-risk situations that are believed to result in increased rates of anxiety, depression, and PTSD in firefighters (Bryant & Guthrie, 2007; Carey et al., 2011). Although the previously mentioned emergencies place a substantial burden upon firefighters, they are also expected to maintain routine duties, such as checking equipment, training, participating in meetings, and fulfilling administrative duties (Saijo, Ueno, & Hashimoto, 2008).

Because of the unique high stress environment faced by firefighters, the mental health status of firefighters has become an area of research interest (Carey et al., 2011). This research predominantly focuses on the rates of PTSD and other aspects of mental health, while also trying to determine other risk factors that could contribute to mental health changes in the firefighting community.

Rates of PTSD among firefighters. Like the data available that pertain to rates of PTSD in the general public, there is little research available that report PTSD rates among firefighters and other emergency services personnel. Furthermore, there is little corroboration among studies reporting firefighter PTSD rates. Of the available studies there is also a division between studies reporting PTSD after exposure to a catastrophic traumatic event and studies reporting PTSD rates among firefighters with occupationally normal levels of traumatic exposure, as detailed below.

For firefighters who responded to the World Trade Center (WTC) terrorist attacks that took place on September 11, 2001, the prevalence of probable PTSD ranged between 11% and 19.5% (Soo et al., 2011). The incidence of probable PTSD reported in the first six months following the attacks was 8.6%, which then increased to a cumulative incidence of 11.1% over 3 years (Berninger et al., 2010), and again to 31.9% over nine years (Wisnivesky et al., 2011). The nine year cumulative incidence of depression and panic disorder were also high at 27.5% and 21.2% respectively (Wisnivesky et al., 2011). Notably, 34% of those with probable delayed onset PTSD at the three year follow-up reported sub-threshold PTSD scores six months after the attack, and 18.9% of those with sub-threshold PTSD scores progressed to probable PTSD at follow-up (Berninger et al., 2010). These figures can be compared to the prevalence of PTSD in

unexposed firefighters who were hired after the close of the WTC site, which was only 1% in all follow-up years (Berninger et al., 2010).

These findings of PTSD among firefighters who responded to the WTC terrorist attack site, compared to PTSD rates among firefighters hired after the site closure, underscore how the severity of the traumatic event can lead to high rates of PTSD—especially rates of delayed onset PTSD. They also show consistency in findings with other extremely traumatic responses, such as disaster relief for Hurricane Katrina, which made landfall on the Gulf Cost of America in August of 2005. Among responding firefighters, cumulative incidence of PTSD and depression at 6-9 months post-landfall was 10.3% and 26.4%, respectively, which then increased to 11.5% and 34.5% at the 13-18 month mark (Osofsky et al., 2011).

Unlike the consistency in data concerning firefighters responding to major natural and man-made disasters, studies reporting PTSD rates among firefighters responding to occupationally normal events are more divisive, with studies reporting PTSD prevalence rates between 0% and 22.2% (Corneil et al., 1999; Haslam & Mallon, 2003). Further complicating matters, the quantity of studies specifically focusing on PTSD in fire service members is limited and even fewer studies focus on American and Canadian firefighters.

Studies outside of the United States and Canada generally report the lowest prevalence of PTSD among firefighters participating in normal day-to-day duty. As such, point prevalence rates of PTSD among German and Taiwanese firefighters were reported to be as low as 18.2% and 10.5% respectively (Chen et al., 2007; Wagner et al., 1998). Even lower rates of PTSD were reported among firefighters serving in the United Kingdom at 6.5% (Haslam & Mallon, 2003), which is comparable to expected PTSD rates among American civilians (APA, 2000). Moreover, these UK researchers went even further, attributing all reported PTSD cases in their study to off-

duty exposures, thereby concluding that the prevalence of PTSD attributable to firefighting service was effectively 0% (Haslam & Mallon, 2003). Although this study reports extremely low PTSD prevalence, it should be noted that 71.0% of participating firefighters reported at least one PTSD symptom over their careers, and 59.1% of those who had experienced at least one symptom also had experienced those symptoms for a duration of more than three months (Haslam & Mallon, 2003). The most common of these symptoms was feeling emotionally upset when reminded of the event (55%), followed by having upsetting thoughts or images about the event (32%), and having trouble falling or staying asleep (23%) (Haslam & Mallon, 2003). It should also be noted that failure to find any real prevalence of PTSD attributable to firefighting service could be due to very limited sample size (n = 31; Haslam & Mallon, 2003) compared to the previously mentioned German (n = 318; Wagner et al., 1998) and Taiwanese (n = 410; Chen et al., 2007) studies.

Studies conducted in the United States and Canada are also limited, with the lowest point prevalence of PTSD among firefighters participating in daily duty reported to be 4.2% (Meyer et al., 2012). However, this value fluctuates between 4 and 13% depending on the method used to determine PTSD status (Meyer et al., 2012)—a discrepancy that punctuates the difficulties associated with using standardized tools in diagnosing PTSD. Although these average PTSD rates are comparable to rates seen in the general population, one study found the prevalence of PTSD among American and Canadian firefighters to be 22.2% and 17.3% respectively (Corneil et al., 1999). Interestingly, this study went further, comparing these prevalence rates to the respective national average PTSD prevalence, thence computing odds ratios attributing exposure to the firefighting profession as a risk factor for PTSD (OR = 3.28 for American firefighters; OR = 4.01 for Canadian firefighters) (Corneil et al., 1999). These odds ratios suggest that American

and Canadian firefighters participating in daily duty are more likely to develop PTSD than their respective population averages, and that there must be at least one factor accounting for this increased PTSD risk.

Firefighter specific factors related to risk of PTSD. Despite the conflicting reports of PTSD rates among firefighters, substantial research has focused on determining which fire service-specific factors may predispose firefighters to increased rates of PTSD and occupational stress. These studies focus on proximity to traumatic exposures, shift work, interdepartmental relations and social support, and other factors associated with the daily duties of firefighters.

As listed in the DSM-5 the intensity and frequency of exposure to a traumatic event is a strong predictor of PTSD (APA, 2013), and this relationship is supported by literature in which firefighters describe their reactions to traumatic events. Firefighters with closer proximity to the traumatic event are more likely to handle dead or severely injured bodies, and to be exposed to greater risk of injury or death to themselves or their colleagues (Baker & Williams, 2001; De Soir et al., 2012; Soo et al., 2011). Specifically, the greatest levels of stress are reported after traumatic events involving children, especially when the attending firefighter has or is closely related to a child of the same age (Baker & Williams, 2001; De Soir et al., 2012; Haslam & Mallon, 2003; Soo et al., 2011). The manageability of the scene has also been cited as a factor related to post traumatic stress, with more manageable situations resulting in less stress (De Soir et al., 2012). Unmanageable scenes may also increase stress and helplessness felt in circumstances where the firefighter wishes they could do more for the victim (Baker & Williams, 2001). Combining all of these factors in the case of a disaster event, response time to the scene has also been associated with levels of PTSD. Specifically, those who report to the scene of a major disaster the earliest and work the longest are also the most likely to experience delayed

onset PTSD with sub-clinical levels of posttraumatic stress shortly after the event (Berninger et al., 2010; Soo et al., 2011).

Apart from factors related to the nature of the traumatic event, factors related to shift work and workload are also associated with stress among firefighters. As many fire departments utilize a system of rotating shiftwork, such as 10 hour days and 14 hour nights, rather than a standard eight hour rotating schedule, sleep disturbances and fatigue are common among firefighters (Carey et al., 2011; Haslam & Mallon, 2003; Saijo et al., 2008). In one study of American firefighters, 60% of participants met the criteria for sleep deprivation, and 38% reported excess daytime sleepiness. As chronic sleep deprivation reduces cognitive ability and memory formation (Carey et al., 2011), this high rate of sleep disturbance could be associated with increased risk of stress and personal injury.

As a result of long work hours, firefighters also spend large quantities of time in each other's company. This amount of time spent as a group can have multiple consequences. One of these consequences is an increased sense of camaraderie (Carey et al., 2011). It is possible that this high level of cohesion could reduce overall stress by improving social support within the organization (Meyer et al., 2012). However, some studies present conflicting theories in fire department interpersonal relations throughout a firefighter's career. One such study reports 14 years of fire service leading to improved cohesion (Meyer et al., 2012), while another suggests cohesion starts strong, but fails as years of service progress (Regehr et al., 2003). The concept behind the latter study's claims is that new recruits are part of a "honeymoon" phase where excitement is high, and that this phase dissipates as opportunities to advance in rank result in competition between colleagues. Furthermore, former colleagues who have advanced to supervisory positions could be seen as "corporate watchdogs", creating a situation of distrust

(Regehr et al., 2003). Although interdepartmental politics likely differ among specific fire departments, belief in this theory would suggest that career firefighters experience less social support within the work place, which could lead to increased rates of traumatic stress, depression, and job dissatisfaction (Corneil et al., 1999; Meyer et al., 2012; Regehr et al., 2003; Saijo et al., 2008). To compound this effect, the nature of a firefighter's shift work may also compromise their ability to maintain social support outside of the workplace (Regehr et al., 2003). As negative social interactions are associated with an increased risk of PTSD (Farnsworth & Sewell, 2011), this degeneration in social networks could actually predispose a firefighter to posttraumatic stress when an event occurs.

Time in the firefighting profession and PTSD. The effect of time spent working in the firefighting profession is an under-researched factor that could also affect PTSD rates. Of the research available, there is limited evidence to support the theory that experienced firefighters are at greater risk of developing PTSD than those just starting their careers (Regehr et al., 2003; Wagner et al., 1998). Considering the only study available researching this theory, new recruits were shown to be significantly less depressed and with significantly lower levels of traumatic stress than their senior coworkers, while expressing higher levels of self-efficacy (Regehr et al., 2003). Although the reason for lower levels of self-efficacy among senior officers is unknown, it may be related to the previously mentioned decrease in opportunities to advance in their profession (Regehr et al., 2003), an inability to accept criticism (Chen et al., 2007), less social cohesion, or other factors such as age (Regehr et al., 2003) or level of education (Bounds, 2006). It is also possible that a cumulative effect of traumatic exposures over the duration of a firefighter's career may impact their ability to cope with stress, leading to increased risk of developing PTSD after any traumatic incident (Wagner et al., 1998). In fact, it has been

suggested that as long as a firefighter maintains active duty, they continue to increase in risk for developing PTSD, and that the only way to avoid stressful stimuli may be to leave the profession, take a leave of absence, or transfer to a non-emergency position such as administration (Wagner et al., 1998). However, the latter option of transferring to an administrative position may increase levels of stress and PTSD risk (Bounds, 2006; Corneil et al., 1999; Haslam & Mallon, 2003), even though a firefighter in this position would not respond to calls and thus not likely be exposed to traumatic events.

Like the limited literature investigating the effect of time in the firefighting profession on the development of PTSD, there is little available research that has specifically investigated recruit related factors associated with PTSD risk. Despite the lack of firefighter recruit specific literature, studies of other professional recruits have investigated PTSD risk. For example, one study of police recruits found that family history of mood and anxiety disorders and substance abuse were associated with an increased risk of developing PTSD symptoms (Inslicht et al., 2010). Interestingly, another study of police recruits did not find an association between pre-employment traumatic exposures and increased risk of PTSD (Huddleston, Stephens, & Paton, 2007). However, a study of US Marine recruits found adverse childhood experiences, specifically related to physical neglect, predicted future risk of developing PTSD (LeardMann, Smith, & Ryan, 2010).

The previously mentioned police and military recruit studies do suggest some ways by which firefighter recruits may be at elevated risk of developing PTSD. However, it is more appropriate to consider firefighter recruit data directly when investigating PTSD risk in firefighting populations. For firefighter recruits specifically, the limited literature available

focuses on personality traits that could result in increased risk of developing PTSD. These factors are discussed in the following section.

Personality as a PTSD Risk Factor in Firefighter Recruits

Many of the previously mentioned risk factors specifically relate to firefighters already working in the field. However, other factors related to increased risk of PTSD may be present in firefighters before they even enter the workforce. Specifically, these factors relate to a prospective firefighter's personality, attitudes, and beliefs. As previously mentioned, studies conducted in the general population have shown that a person's tendency toward negative personality traits (including neuroticism, hostility, dissociation, emotional dysregulation, and low-self efficacy) increases risk of developing PTSD (Heinrichs et al., 2005; Smith et al., 2011; Van Ameringen et al., 2008). Studies specifically investigating the personality of firefighters have found similar effects, with firefighters who exhibit high fear of expressing emotion (Farnsworth & Sewell, 2011) and blame themselves when situations go awry (Meyer et al., 2012) possessing an increased risk of developing PTSD upon exposure to a traumatic event.

Considering other personality factors related to increased risk of PTSD, negative self-appraisal may predict PTSD risk even before beginning work in the firefighting service. One British study found that the extent to which firefighters engaged in negative self-appraisals before beginning their service accounted for 20% of the variance in PTSD severity four years later (Bryant & Guthrie, 2007). Low self-efficacy has also been associated with risk of PTSD and depressive symptomology. As such, those who feel that they have not met their own expectations tend to perceive their levels of stress to be elevated (Bounds, 2006). This effect of low self-efficacy is also exacerbated among firefighters who expressed pre-existing levels of high hostility. For firefighters expressing both of these personality traits at baseline, one

American study found that these traits accounted for 42% of the variance in PTSD after two years of follow-up (Heinrichs et al., 2005). Conversely, those expressing low hostility and high self-efficacy benefited from a protective effect against posttraumatic symptomology (Heinrichs et al., 2005). Interestingly, this study also reported that the greatest increase in pathological symptoms occurred between 6 and 12 months after entry into the firefighting profession (Heinrichs et al., 2005).

Although there is evidence to suggest a link between certain personality traits and PTSD risk among firefighters, there are few studies that investigate the personalities of people who feel drawn to entering the firefighting profession (Wagner, Martin, & McFee, 2009). If a certain personality type is associated both with entering into the firefighting profession and an increased risk of developing PTSD, then the effect of personality could partially account for the elevated PTSD rates found among firefighters. However, in order to investigate this effect it must first be understood what models of personality exist and what tools can be used to determine personality type.

Models of personality. Of all of the models of personality, the Five Factor Model (FFM) is the most well-known and current (Wagner, 2005). Developed by Costa and McCrae (1992), the FFM encompasses five personality factors consisting of extroversion, neuroticism, openness to experience, agreeableness, and conscientiousness. These five factors incorporate thirty specific aspects of personality that are consistent over a person's lifetime, regardless of situational changes. As a measurement of the FFM, Costa and McCrae also developed the NEO Personality Inventory (NEO-PI), which is a self-completed questionnaire designed to determine how a person relates to each of the five factors (Costa & McCrae, 1985).

Beyond the FFM, many other models of personality exist. Of these models, the two most notable are Cattell's 16PF (Cattell & Krug, 1986) and Eysenck's Three Factor Model (TFM) (Eysenck & Eysenck, 1975). Cattell's 16PF describes normal personality across the 16 factors of cool-warm, concrete thinking-abstract thinking, affected by feelings-emotionally stable, submissive-dominant, sober-enthusiastic, expedient-conscientious, shy-bold, tough minded-tender minded, trusting-suspicious, practical-imaginative, forthright-shrewd, self assured-apprehensive, conservative-experimenting, group oriented-self sufficient, undisciplined self conflict-following self-image, and relaxed-tense (Cattell & Krug, 1986). Eysenck's TFM, on the other hand, only describes personality as a combination of extroversion, neuroticism, and psychoticism. Like the FFM, these three factors encompass a large set of sub dimensions of personality, and testing is performed by way of the self-completed Eysenk Personality Questionnaire (Eysenck & Eysenck, 1975).

Studies of personality in recruits. As mentioned, there are few studies investigating personality factors of firefighters just entering the workforce. In 1990, Mitchell and Bray (1990) authored a description of the "rescue personality" which became a widely cited work when describing the personality of firefighters and other rescue personnel. This rescue personality described firefighters as possessing many Type A personality traits, including perfectionism and liking control, and requiring large amounts of stimulation (Wagner et al., 2009). This requirement of stimulation was also reported in another widely cited study by Zaleski (1984) that found firefighters and other rescue personnel to exhibit higher levels of risk-taking and sensation-seeking behaviour than controls (Zaleski, 1984). This finding of elevated sensation-seeking among firefighters has also been replicated in more modern studies conducted in Iran

and the United States (Gorji, Fathi, Hatamy, & Khoshkonesh, 2011; Salters-Pedneault, Ruef, & Orr, 2010).

Despite its wide citation and support by some recent studies, the "rescue personality" has come under scrutiny. Results of an investigation into the personality of firefighters in a large northern BC centre did not find greater levels of Type A behaviour, sensation seeking, or lower perception of risk in high-risk situations when compared to a control population. Interestingly, the only factor by which these firefighters differed from the control population was extroversion, with firefighters reporting higher levels than controls. However, due to the cross-sectional nature of this study's design, it could not be determined whether extroverted people are attracted to the fire service or if the highly social environment of the fire department could lead respondents to report higher levels of extroversion (Wagner et al., 2009).

This difficulty in determining whether extroverted people are attracted to the firefighting service, or elevated extroversion is an artefact of being a firefighter is a challenge that plagues many of the studies investigating firefighter personality and its role in the development of PTSD. A lack of truly prospective studies or direct comparisons of firefighter recruit personalities with community control groups is the root cause of these difficulties. As such, studies investigating these effects need to be designed in order to directly attribute any personality differences to recruits themselves, rather than firefighters already in the profession.

Treating PTSD and Chronic Stress in Firefighters

Theoretically, the most effective way to prevent PTSD would be to prevent exposure to traumatic stress. However, due to the nature of the work, a firefighter would have to leave the profession in order to make this option feasible (Wagner et al., 1998). Rather, improving firefighters' abilities to cope with traumatic and chronic stress may be a more reasonable option.

Training in effective coping skills—focusing specifically on anger management, relaxation training, attribution training, and emotional disclosure—may be effective in mitigating PTSD risk when faced by a traumatic event (Brown, Mulhern, & Joseph, 2002). Along with these improved coping strategies, team building within fire departments may also improve social support, which, as previously described, can reduce the chances of developing PTSD (Corneil et al., 1999). To increase social cohesion and reduce stress, the use of humour between colleagues and administration may also be useful (Haslam & Mallon, 2003).

Beyond the previously mentioned preventative techniques that can improve a firefighter's resilience against developing PTSD after a traumatic event, other therapeutic techniques are available after exposure to a traumatic event has occurred. A technique specifically developed for use by emergency services personnel is Critical Incident Stress Debriefing (CISD), which has become popular over recent years (Irving & Long, 2001). Along with CISD, psychopharmacological agents such as selective serotonin reuptake inhibitors (SSRIs), are also commonly used in the treatment of PTSD symptoms (Bisson, 2007).

Critical Incident Stress Debriefing and Management. Critical Incident Stress Debriefing is intended as a one or two session intervention that takes place no later than 48 hours after the traumatic incident. It has been suggested that the longer CISD is delayed, the greater the chances of developing PTSD in the future and of experiencing greater long term emotional effects. It has also been suggested that these CISD sessions are most effective when they take place in a natural group setting with people who have experienced the same or like trauma (Kirk & Madden, 2003). The seven phase program of CISD (Irving & Long, 2001) is designed to teach the participant to acknowledge their stress response to the traumatic event as a normal experience (Kirk & Madden, 2003), and allow the trauma to be processed and assimilated into the

participant's existing cognitive schema (Stallard & Salter, 2003). Advocates favouring the use of CISD claim that it also allows participants to replace negative events from the trauma with positive messages that inhibit the development of remorse, phobic responses, or pathological guilt, and allows the participant's body to return to homeostasis (Kirk & Madden, 2003).

Because of these purported benefits of CISD in the treatment of PTSD, many international organizations have used this method of treatment after traumatic events, including the United Nations and the International Federation of Red Cross and Red Crescent Societies, as well as many law enforcement agencies and emergency service providers in the United States, Europe, Scandinavia, Australia, and Canada (Regel, 2007). For these employers, CISD is seen as a useful way to provide emotional and psychological support (Devilly, Gist, & Cotton, 2006) in a way that is sensitive to work cultures, uses peer processes, and gives employees a chance to share (Becker et al., 2009).

Despite its popularity among many national and international organizations, the efficacy of CISD in the prevention of PTSD development after traumatic exposure has come under criticism. Although CISD programs have been generally perceived as being "helpful" among emergency services personnel (Devilly et al., 2006), it has been suggested that those who value CISD the most are the ones who also need it the least (Raphael & Wooding, 2004). Furthermore, some studies involving firefighters and other emergency services personnel have even gone as far as to conclude that CISD is associated with an even greater risk of PTSD when compared to those who do not participate in CISD (Bryant, 2007; Irving & Long, 2001; Kaplan, Iancu, & Bodner, 2001; Rose, Bisson, Churchill, & Wessely, 2002; Szumilas, Wei, & Kutcher, 2010). One randomized control trial (RCT) of burn victims who either did or did not participate in CISD after their incident revealed that 26% of CISD participants went on to develop PTSD as

compared to 9% of the control group (Bisson, Jenkins, Alexander, & Bannister, 1997). This finding is supported by another RCT investigating CISD among traffic accident victims. In this study, those who participated in CISD after their incident scored significantly higher on the Impact of Event Scale (IES) three years post CISD than the controls, which suggests greater levels of PTSD within the CISD group. Furthermore, this study found an interactive effect between baseline IES scores and CISD, suggesting that those most traumatized before CISD were even more traumatized three years later (Mayou, Ehlers, & Hobbs, 2000). As CISD encourages specific reporting of the traumatic event among everybody in the group, this reconstruction of events may inadvertently intensify the already disturbing reactions by reconnecting the participants with the source of the discomfort and traumatisation before they are able to distance themselves (Devilly et al., 2006; van Emmerik, Kamphuis, Hulsbosch, & Emmelkamp, 2002).

The lack of evidence supporting the efficacy of CISD in preventing the development of PTSD may ultimately stem from the fact that CISD was not developed as a standalone intervention. Rather, it was developed for use with emergency personnel in a broader Critical Incident Stress Management (CISM) intervention (van Emmerik et al., 2002). Critical Incident Stress Management consists of pre-incident training that prepares emergency personnel for traumatic events, CISD following the traumatic event when it occurs, and individual follow-up with counsellors for as long as the emergency worker feels necessary (Richards, 2001). Results of studies on the efficacy of CISM in preventing and treating PTSD have shown CISM to be much more promising than CISD alone, which may be attributable to the pre-incident training, one-on-one counselling, or a combination of both. These studies have also shown that significant improvement can be made with smaller investments of therapist time if the CISD was used as

part of CISM and if the intervention is delivered one month after the trauma rather than immediately preceding the exposure (Richards, 2001).

Psychopharmacological treatments for PTSD. As stated previously, it is desirable to prevent the development of PTSD rather than treat it after its onset. Although no psychopharmacological agent has been approved in the prevention of PTSD development, researchers have attempted to make preventative treatments more feasible (Steckler & Risbrough, 2012). Preventative pharmaceutical agents are administered after exposure to a traumatic event has occurred but before the onset of PTSD symptoms, with the hope that these PTSD symptoms never develop. Some research has supported the use of antagonists to glucocorticoid receptor (GR), corticotropin-releasing factor 1 (CRF1), and cholecystokinin 2 (CCK2) in the suppression of HPA axis activities that lead to the exaggerated stress response typical of PTSD. However, the validity of these findings is still highly scrutinized in the literature (Steckler & Risbrough, 2012). More widely accepted in the literature is the usefulness of ketamine and morphine in preventing PTSD development. The analgesic Ketamine, an NMDA receptor antagonist, has been shown to alter the memory consolidation process, thereby reducing PTSD development in clinical trials. Morphine administration shortly after exposure to a traumatic event has also shown to supress PTSD development in naturalistic studies, however, the mechanism by which morphine causes these effects is unknown (Steckler & Risbrough, 2012). Despite promising advances in research, more research is needed to investigate the effectiveness of these preventative treatments before they can be used in clinical practice.

Currently, the only psychopharmacological treatments approved by the Food and Drug Administration for clinical use are agents that suppress non-cognitive PTSD symptoms (Steckler & Risbrough, 2012). The most widely used of these agents are antidepressant serotonin reuptake

inhibitors (SSRIs) (Bisson, 2007; Tawa & Murphy, 2013; van der Kolk, 2001). These treatments are administered after the onset of PTSD symptoms and have shown to be effective in reducing the severity of PTSD symptoms and preventing PTSD relapse. Despite the widespread use of SSRIs in the treatment of PTSD by clinicians only 60% of patients respond to treatment, on average, and only 20-30% achieve full remission (Steckler & Risbrough, 2012). In spite of the questionable effectiveness of SSRIs in the treatment of PTSD symptoms and reported adverse side-effects, including reduced sexual drive, nausea, insomnia, and fluctuations in body weight, these pharmaceuticals are considered to be well tolerated and safe for patient use (Bisson, 2007; Steckler & Risbrough, 2012). Besides the use of SSRIs, other antidepressants, including imipramine, monoamine oxidase inhibitors, and reversible monoamine oxidase A inhibitors, have shown effectiveness in reducing PTSD symptoms. However, these antidepressants are not as well tolerated as SSRIs (Steckler & Risbrough, 2012).

Some psychopharmacological agents may also be effective in treating the cognitive symptoms of PTSD, such as intrusive memories, nightmares, and flashbacks. Administration of low-dose cortisol, a GR agonist, has shown effectiveness in reducing traumatic memories among PTSD patients in small case control studies through the impairment of the memory retrieval process (Steckler & Risbrough, 2012). This use of GR agonists in the treatment of PTSD is interesting considering that GR antagonists, as previously described, are also effective in the treatment of PTSD. Through clinical trials, ketamine is also beneficial in reducing the severity of PTSD symptoms by altering the memory retrieval process (Steckler & Risbrough, 2012). However, further research is needed before widespread use of these pharmaceuticals can be applied in the treatment of PTSD.

Conclusion from the Literature

Firefighting is a high stress profession that can involve exposures to many traumatic events, such as unmanageable fires, medical emergencies involving serious injury or death, and large-scale community disasters (Corneil et al., 1999). For firefighters responding to disastrous events, such as a natural disaster or terrorist attack, a consensus exists in the literature that these firefighters are at a greater risk of experiencing an adverse stress reaction such as PTSD (Berninger et al., 2010; Osofsky et al., 2011; Soo et al., 2011; Wisnivesky et al., 2011). The risk of developing delayed onset PTSD is also increased when firefighters work within close proximity to the disaster and when they are one of the first responders (Berninger et al., 2010).

For firefighters working within occupationally normal levels of exposure, there is less consensus in the literature as to the risk of developing PTSD among firefighters, with reported prevalence ranging above and below the Canadian population average (Van Ameringen et al., 2008). However, of the few studies focusing on American and Canadian firefighters, there is evidence to suggest that PTSD rates among firefighters are greater than the population averages (Corneil et al., 1999). Further research is needed to establish a standardized method of assessing PTSD prevalence among firefighters and the general population, which would theoretically lead to more consistent measures of PTSD prevalence in these populations.

Along with standardization of instruments, more research is needed in determining what firefighter specific factors could be related to PTSD. As there seems to be large variation in interpersonal and intrapersonal characteristics between fire departments (Carey et al., 2011; Meyer et al., 2012; Regehr et al., 2003), it is possible that the variance in PTSD rates between studies may actually be attributable to interdepartmental differences in personality and management characteristics. Although it is important to know whether the firefighting population

is at a greater risk of developing PTSD as a result of their work service, an understanding of the factors that predispose a firefighter to developing PTSD would be beneficial when developing interventions to reduce excess risk.

As mentioned, one possible factor predisposing firefighter recruits to increased risk of PTSD development is personality. If these specific PTSD predisposing personality traits are more common among firefighter recruits, then the general personality of firefighters could partially account for the excess risk of developing PTSD in career firefighters observed in the literature. Unfortunately, very little research exists investigating what, if any, personality types are associated with firefighters. Furthermore, within the limited research studies exploring the rescue personality, none were found that directly examined the personality of firefighter recruits and compared them to non-rescue community controls. Thanks to the unique social dynamic of fire departments, the personalities of career firefighters may be influenced by the environmental and social aspects of working in the firefighting service. For this reason, research is needed to explore the predispositional nature of the "rescue personality." These studies can either directly compare firefighter recruit personalities to a community control sample or use a longitudinal design to determine if self-reported personality changes between the recruit and career firefighting service stages.

Based on the literature available, increasing social support within departments and proactive teaching of coping skills to manage traumatic stress when it occurs should be areas of focus when developing PTSD preventative interventions in the firefighting population (Brown et al., 2002; Corneil et al., 1999). In regards to therapeutic interventions for PTSD, reliance on CISD should be used with caution as CISD may inadvertently cause participants to relive aspects of the traumatic event that may not have directly experienced themselves (Devilly et al., 2006;

van Emmerik et al., 2002). In cases where this does occur, CISD may actually increase the risk of developing PTSD in an already high risk population (Bryant, 2007; Irving & Long, 2001; Kaplan et al., 2001; Rose et al., 2002; Szumilas et al., 2010). In order to avoid the possible detrimental effects of using CISD alone, CISD should be incorporated into a wider CISM program along with individual counselling when traumatic events do occur (van Emmerik et al., 2002) and proactive teaching of coping skills.

Hypotheses

The purpose of the current study is to address the previously mentioned gaps in the literature concerning the personality of firefighter recruits. It is hypothesised that firefighter recruits, as compared to community controls, are more likely to report higher levels of hostility, extroversion, sensation seeking, and Type A behaviour; and lower levels of risk perception, openness to experience, emotional intelligence, life satisfaction, and proactive coping. Furthermore, it is hypothesised that firefighter recruits are also more likely to report higher levels of PTSD symptomatology and other mental health issues than controls.

These hypotheses are based on the description of the "rescue personality" by Mitchell and Bray (1990), previous research investigating the rescue personality (Gorji et al., 2011; Salters-Pedneault et al., 2010; Wagner et al., 2009; Zaleski, 1984), and the public perception of firefighters being "adrenaline seeking" and "risk taking."

Method

Sampling and Data Collection

As part of an ongoing partnership with a Northern British Columbia fire department, every new firefighter recruit beginning work with the fire department between 2005 and 2014 has been asked to participate in this study. Given the nature of the hiring and training procedures,

participating recruits were sampled in small groups during their first weeks of training. As such, data collection was distributed over many sessions throughout the calendar years. Although the questionnaires remained constant throughout the study duration, different researchers were involved in the data collection procedure, with only one researcher administering the questionnaires at any given time.

At the beginning of each data collection session, the participants were introduced to the study and the nature of research procedures. Participants were then asked to complete an informed consent form and demographic questionnaire. Over the following half-hour to one hour session, participants then completed the remaining questionnaire package, consisting of the NEO-Five Factor Inventory (NEO-FFI), Symptom Checklist 90-Revised (SCL-90-R), Impact of Events Scale-Revised (IES-R), Framingham Type A Scale, Satisfaction With Life Scale, Emotional Intelligence Scale, Proactive Coping Inventory, Physical Risk Assessment Inventory, and Zuckerman Sensation Seeking Scale.

Upon completion of the firefighter recruit data collection, a comparison group was formed, consisting of men living in Northern British Columbia communities. This process took place over one month in the fall of 2013, and was conducted by one researcher. Controls were carefully sampled to individually match the demographics of the firefighter recruit participants based on age within three years, sex, marital status, education, and ethnicity. For the purposes of this study, college graduates and university undergraduates were matched as the same level of education, and separated and divorced were matched as the same marital status. Sampling of the comparison group was completed through the snowball approach, initially consisting of a convenience sample known by the primary researchers. Those who were excluded from the study

because they did not match a firefighter recruit's demographics were asked to suggest other participants who might be willing to participate.

As participants were recruited to the comparison group, they were introduced to the study and asked to complete the same consent form, demographic information, and questionnaire package as completed by the firefighter recruits. However, different from the procedure used with the firefighter recruits, control participants were given the questionnaire package to compete at their leisure, and the packages were collected at a later date. Although participation was voluntary, those firefighter recruits and control participants who completed the survey were compensated through a five-dollar donation to either the British Columbia Burn Fund or another charity of their choice, made on behalf of the participant.

Measures

The IES-R (Weiss & Marmar, 1996) was used as an evaluation of previous PTSD symptomatology. This scale consists of 22 questions concerning the stress response experienced in the seven days following a pervious traumatic event. Studies using the IES-R have reported strong test-retest reliability (r = 0.78 to 0.82; Newman, Kaloupek, & Keane, 1996), and internal consistency of the scale (α = 0.83 to 0.92; Simons, Gaher, Jacobs, Meyer, & Johnson-Jimenez, 2005; Zilberg, Weiss, & Horowitz, 1982).

The SCL-90-R (Derogatis, 1994) is a 90 question checklist designed to assess mental health across nine different symptom scales: somatisation, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. As a whole, the SCL-90-R has shown high reliability (r = 0.77 to 0.90; Derogatis, 1994; Vallejo, Jordán, Díaz, Comeche, & Ortega, 2007) and consistency (α = 0.97 to 0.98; Sun, Zhang, & Fu, 2010; Vallejo et al., 2007). However, the internal consistency of each subscale range in internal

consistency from $\alpha = 0.72$ for the phobic anxiety subscale to $\alpha = 0.92$ for the depression subscale (Vallejo et al., 2007).

The NEO-FFI (Costa & McCrae, 1992) and Framingham Type A Scale (Haynes, Levine, Scotch, Feinleib, & Kannel, 1978) were used as evaluations of personality. The NEO-FFI is a 60 question inventory designed to assess neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness; while the Framingham Type A Scale is a three part questionnaire with a total of 10 items designed to assess Type A personality traits. The NEO-FFI has good internal consistency across subscales ($\alpha = 0.72$ to 0.90; (Costa & McCrae, 1992; Egan, Deary, & Austin, 2000) and the Framingham Type A Scale has shown decent concordance with structured interviews (60-70%; Haynes, Feinleib, & Kannel, 1980).

The Zuckerman Sensation Seeking Scale (Zuckerman, Kolin, Price, & Zoob, 1964) and Physical Risk Assessment Inventory (Llewellyn, 2003) were used as evaluations of risk perception and willingness to take risks. The Zuckerman Sensation Seeking Scale is a 19 item scale designed to assess an individual's willingness to partake in risky behaviours ($\alpha = 0.62$-0.83; Zuckerman, Eysenck, & Eysenck, 1978; Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993), while the Physical Risk Assessment Inventory is a 27 item inventory designed to assess attitudes toward the physical risk posed by numerous risky activities ($r = 0.9$; Llewellyn, 2003).

The Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffin, 1985) is a five question scale designed to assess an individual's overall satisfaction with their life, including current living conditions and past accomplishments. It has displayed strong internal consistency ($\alpha = 0.79$ to 0.89; Adler & Fagley, 2005; Pavot & Diener, 1993; Steger, Frazier, Oishi, & Kaler, 2006) and test-retest reliability ($r = 0.80$ to 0.84; Pavot, Diener, Colvin, & Sandvik, 1991; Steger et al., 2006).

The Proactive Coping Scale (Greenglass, Schwarzer, & Taubert, 1999) is designed to assess whether or not an individual uses proactive coping methods. This 14 item scale is a component of the seven-scale Proactive Coping Instrument and, when used alone, has a good internal consistency ($\alpha = 0.88$; Sohl & Moyer, 2009).

Finally, the Emotional Intelligence Scale (Schutte et al., 1998) is a 33 item scale designed to assess whether an individual has a high or low emotional intelligence. This scale has shown excellent internal consistency and strong test-retest reliability ($\alpha = 0.90$, $r = 0.78$; Schutte et al., 1998).

Statistical Analysis

As control participants were matched to the marital status, education status, gender, age, and ethnicity of the individual firefighter recruits, statistical analysis of these demographics was unnecessary. For the unmatched variables of self-reported health status and family income, descriptive statistics and one-way analyses of variance (ANOVA) were conducted comparing firefighter recruit and control responses.

Given the relatively small sample size of the study ($n = 22$ for both firefighter recruits and controls), statistical analysis was never intended to be the primary means of data analysis. As such, descriptive statistics and one-way between-subjects ANOVAs were conducted comparing control and firefighter recruit responses for each measure and subscale included in the study to supplement the findings of the epidemiological analysis described below.

Epidemiological Analysis

In order to utilize epidemiological methods, this study was designed to replicate an individually matched case-control study, with the firefighter recruits serving as the case group and the comparison group as the control group. With the study groups defined, the continuous

variables produced by the responses to the questionnaires needed to be dichotomised to represent positive and negative "exposure" statuses. This dichotomisation was conducted using cut-off values recommended in the literature when available. As such, a total score greater than or equal to 33 was considered possible PTSD presence using the IES-R (Creamer, Bell, & Failla, 2003), a score less than or equal to 19 was considered below average using the Satisfaction With Life Scale (Pavot & Diener, 2008), and a score less than 125 was considered below average using the Emotional Intelligence Scale (Schutte et al., 1998).

For each subscale of the NEO-FFI, scores were compared to an American adult male standardized sample (Costa & McCrae, 1992) and a score above the 50th percentile was considered presence of the trait. As the NEO-FFI is an evaluation of five different personality traits, this cut-off was chosen as any score greater than the 50th percentile represents greater than average expression of the trait.

For each subscale of the SCL-90-R, raw scores were converted to t-scores and compared to a standardized sample of non-patient American adult males (Derogatis, 1994). As the SCL-90-R is a clinical assessment of nine symptoms of psychopathology, a more conservative cut-off than the NEO-FFI was needed. As such, the 90th percentile was chosen as an appropriate cut-off, and t-scores above this percentile were considered possible presence of the psychopathological condition across each subscale.

For those questionnaires without clear cut-offs documented in the literature (the Proactive Coping Inventory, Framingham Type A Scale, Physical Risk Assessment Inventory, and Zuckerman Sensation Seeking Scale), a median split was utilized. To support the use of a median split, the responses to each of these questionnaires were pooled and the uniformity of the data

was qualitatively assessed before splitting the data sets. In each case, the data appeared uniform with similar means, medians, and modes.

Using the newly dichotomised variables as "exposure" status, the individual firefighter recruit "cases" were paired with their respective community "controls," and Mantel-Haenszel odds ratios and Fisher's 95% confidence intervals were calculated from the discordant pairs. The modified Wald test (May & Johnson, 1997) was used to assess the significance of the odds ratios based on its ability to maintain strong validity and power when working with small sample sizes.

Results

Participant Demographics

Every new firefighter recruited between 2005 and May 2013 to a northern BC fire department agreed to participate in this study (n = 22). Of the control participants who were approached to be part of the study and matched the demographics of a firefighter recruit, 100% also agreed to participate (n = 22). Every firefighter recruit was a Caucasian male, as the participating fire department had only recruited Caucasian males within the sampling timeframe. Through individual matching, all control participants were also Caucasian males. All control participants were working in non-rescue professions at the time of response: six college/university students, nine crafts and trades workers, two technicians, four professionals, and one manager. As control participants were also individually matched to the firefighter recruits based on education and marital status, the study groups did not differ in terms of these factors. Through matching, there was also no difference between firefighter recruits (M = 29.55, SD = 3.85) and controls (M = 28.91, SD = 4.67) in terms of age ($F(1, 42) = 0.24$, $MSE = 18.32$, $p = .624$). Firefighter recruits and controls also did not differ in terms of the unmatched variables of family income ($F(1, 42) = 2.327$, $MSE = 2.33$, $p = .121$) or health status ($F(1, 42) = 3.342$,

MSE = 0.55, p = .075). The frequencies for all demographic variables except age are presented in Table 1.

Table 1

Demographic characteristics of firefighter (FF) recruits and controls.

		FF Recruits (n = 22)		Controls (n = 22)	
Variable	Level	n	%	n	%
Education					
	High School	1	4.5	1	4.5
	Some College or University	7	31.8	7	31.8
	Graduated College	6	27.3	3	13.6
	Graduated University	8	36.4	11	50.0
Marital Status					
	Never Married	9	40.9	9	40.9
	Married or Common Law	12	54.5	12	54.5
	Separated	1	4.5	0	0
	Divorced	0	0	1	4.5
Family Income					
	Less than $20,000	0	0	2	9.1
	$20,000 - $30,000	0	0	4	18.2
	$30,000 - $40,000	2	9.1	2	9.1
	$40,000 - $50,000	4	18.2	1	4.5
	$50,000 - $60,000	7	31.8	3	13.6
	Greater than $60,000	9	40.9	10	45.5
Health Status					
	Very Good	15	68.2	12	54.5
	Above Average	7	31.8	5	22.7
	Average	0	0	4	18.2
	Below Average	0	0	1	4.5

Note: Education and marital status were individually matched between participant groups. For matching purposes, "Graduated College" and "Graduated University" were considered the same education, and "Separated and Divorced" were considered the same marital status.

Personality Factors

For the Framingham Type A Scale, the control group (M = 6.88, SD = 1.61) scored significantly higher than the firefighter recruits (M = 5.67, SD = 1.70), with a fairly large effect

size ($F(1, 42) = 5.87$, $MSE = 2.76$, $p = .020$, $\eta^2 = .123$). The odds of a firefighter recruit reporting high Type A behaviour scores were also significantly lower than controls at OR = 0.10 (95% CI 0.002 to 0.70, $p = .002$).

In regards to the Openness to Experience subscale of the NEO-FFI, control participants (M = 30.27, SD = 4.36) scored significantly higher than firefighter recruits (M = 26.36, SD = 4.04), with a large effect size ($F(1, 42) = 9.52$, $MSE = 17.65$, $p = .004$, $\eta^2 = .185$). The accompanying epidemiological analysis also suggested a lower odds of high openness to experience scores among firefighter recruits, though this odds ratio was not significant (OR = 0.33, 95% CI 0.06 to 1.34, $p = .075$).

For all other subscales of the NEO-FFI, no statistical or epidemiological difference was found between firefighter recruit and control responses. Results and mean scores for these NEO-FFI subscales and the Framingham Type A Scale are found in Table 2.

Table 2

Firefighter (FF) recruit and control means (M), standard deviations (SD), and results of one-way ANOVAs and odds ratios across the Framingham Type A Scale (FTAS) and each subscale of the NEO-Five Factor Inventory (NEO-FFI).

	FF Recruits (n = 22)		Controls (n = 22)		ANOVA	Matched Odds Ratios
Measure	Mean	SD	Mean	SD	$F(1, 42)$	OR (95% CI)
FTAS	5.67	1.70	6.88	1.61	5.87*	0.10** (0.002-0.70)
NEO-FFI						
Neuroticism	16.27	7.60	16.50	6.21	0.01	1.67 (0.34-4.20)
Extraversion	33.18	5.30	31.14	5.00	1.73	2.50 (0.41-26.25)
Openness to Experience	26.36	4.04	30.27	4.36	9.52**	0.33 (0.06-1.34)
Agreeableness	30.91	4.84	30.86	5.16	<0.01	0.43 (0.07-1.88)
Conscientiousness	35.95	5.59	34.82	5.16	0.49	2.50 (0.41-26.25)

*p<.05. **p<.005.

Sensation Seeking and Risk Taking

Statistical analysis revealed no significant difference between firefighter recruit and control mean responses to the Zuckerman Sensation Seeking Scale and Physical Risk Assessment Inventory. Likewise, epidemiological analysis also did not result in significant odds ratios. A summary of the statistical and epidemiological results, along with the mean responses to each measure, is found in Table 3.

Table 3

Firefighter (FF) recruit and control means (M), standard deviations (SD), and results of one-way ANOVAs and odds ratios across the Zuckerman Sensation Seeking Scale (ZSSS) and Physical Risk Assessment Inventory (PRAI).

	FF Recruits (n = 22)		Controls (n = 22)		ANOVA	Matched Odds Ratios
Measure	M	SD	M	SD	F (1, 42)	OR (95% CI)
ZSSS	0.50	0.22	0.48	0.16	0.11	1.00 (0.19-5.37)
PRAI	4.01	0.53	4.10	0.66	0.28	1.50 (0.36-7.23)

Mental Health and Previous Post-Traumatic Stress

Mean response scores for the total and each subscale of the IES-R were not found to be significantly different between firefighter recruits and controls (Table 4). However, epidemiological analysis revealed the odds of possible PTSD presence to be significantly lower among firefighter recruits than controls (OR = 0.14, 95% CI 0.003 to 1.11, p = .027).

Across each subscale of the SCL-90-R, no statistical or epidemiological difference was found between firefighter recruit and control responses. Results and mean scores for each subscale of the SCL-90-R and the IES-R are found in Table 4.

Table 4

Firefighter (FF) recruit and control means (M), standard deviations (SD), and results of one-way ANOVAs and odds ratios across the subscales of the Impact of Events Scale-Revised (IES-R), and the Symptom Checklist 90-Revised (SCL-90-R).

	FF Recruits (n = 22)		Controls (n = 22)		ANOVA	Matched Odds Ratios
Measure	Mean	SD	Mean	SD	F(1, 42)	OR (95% CI)
IES-R						
Avoidance	0.63	0.83	1.06	0.89	2.70	-
Intrusion	0.78	0.85	1.30	0.90	3.77	-
Hyperarousal	0.60	0.89	0.89	0.92	1.17	-
Total Score	14.91	17.88	24.18	17.77	2.98	0.14* (0.003-1.11)[a]
SCL-90-R						
Somatisation	51.23	11.79	53.59	11.57	0.45	2.00 (0.10-118.00)
Obsessive-Compulsive	60.45	9.52	56.18	8.82	2.39	1.25 (0.27-6.30)
Interpersonal Sensitivity	58.73	9.75	55.59	9.76	1.14	2.00 (0.29-22.11)
Depression	58.86	11.19	54.91	10.73	1.43	1.50 (0.36-7.23)
Anxiety	53.59	11.96	51.55	10.98	0.35	1.67 (0.32-10.73)
Hostility	54.91	12.72	56.18	9.57	0.14	1.75 (0.45-8.15)
Phobic Anxiety	49.27	6.36	50.91	8.99	0.49	0.33 (0.006-4.15)
Paranoid Ideation	54.59	11.50	51.00	10.64	1.16	1.67 (0.32-10.73)
Psychoticism	56.64	12.89	51.86	9.88	1.90	1.00 (0.23-4.35)
GSI	58.14	11.37	55.82	10.46	0.50	1.50 (0.36-7.27)
PST	56.45	9.04	54.36	10.01	0.53	1.00 (0.19-5.37)
PSDI	56.00	12.38	54.91	6.48	0.13	3.50 (0.67-34.53)

Note: GSI = Global Severity Index. PST = Positive Symptom Total. PSDI = Positive Symptom Distress Index.
[a]Although the Fisher's 95% CI spanned 1.0, the overall OR was significantly different from 1.0 using the modified Wald Test.
*p<.05.

Satisfaction with Life, Coping, and Emotional Intelligence

For responses to the Satisfaction With Life Scale, Proactive Coping Scale, and Emotional Intelligence Scale, no significant difference was found when comparing means or dichotomised variables between firefighter recruits and controls. Results of these analyses and mean scores for these measures are found in Table 5.

Table 5

Firefighter (FF) recruit and control means (M), standard deviations (SD), and results of one-way ANOVAs and odds ratios across the Proactive Coping Inventory (PCI), Satisfaction With Life Scale (SWLS), and Emotional Intelligence Scale (EIS).

	FF Recruits (n = 22)		Controls (n = 22)		ANOVA	Matched Odds Ratios
Measure	Mean	SD	Mean	SD	F (1, 42)	OR (95% CI)
PCI	46.14	4.68	46.14	5.09	0.00	1.17 (0.34-4.20)
SWLS	28.14	4.61	28.14	3.98	0.00	1.00 (0.01-78.50)
EIS	125.00	13.43	126.32	7.76	0.16	2.25 (0.63-10.00)

Discussion

As described by Mitchell and Bray (1990), firefighters and other emergency services personnel are subject to the "rescue personality." This rescue personality describes firefighters as being action oriented, thrill seeking, socially conservative, dedicated, and driven to a high standard of performance. This description also accords with Zaleski's (1984) depiction of firefighters being more sensation seeking and risk taking. Since its description in 1990, a few studies have investigated the rescue personality, or at least its components, with mixed results. One such study investigated the rescue personality among career firefighters working with the same fire department from which the firefighter recruits of the current study were sampled. This study failed to find any significant difference between career firefighters and a comparable control sample in terms of Type A behaviour, sensation seeking, risk perception, conscientiousness, and openness to experience. However, career firefighters were found to be more extroverted than controls (Wagner et al., 2009).

Beyond the growing doubts concerning the legitimacy of the "rescue personality," one weakness of Mitchell and Bray's description is that it fails to discuss whether the rescue personality predisposes an individual to seeking employment in the firefighting profession, or if it is an artefact of socialization to the job's tasks (Wagner, 2005). If the rescue personality is

predispositional, it would mean that people with this personality are likely drawn to the firefighting or other emergency service profession. Conversely, if this personality is based on socialization and environmental factors, it would mean that firefighters do not differ from the general community in terms of personality before starting their careers, and that firefighter personalities change sometime after beginning work in the profession (Bennett & Greenstein, 1975).

The existing literature fails to address the question of whether the rescue personality is predispositional or whether it is an artefact of working in the profession. Existing studies only investigate the rescue personality in firefighters already working in the profession, fail to include community controls, or only explore factors proximal to the factors underlying the "rescue personality." The current study was designed to address this gap in the literature by directly studying factors related to the "rescue personality" among firefighter recruits who have not yet started work in their profession, and comparing them to non-rescue community controls.

"The Rescue Personality"

Openness to experience. Following Mitchell and Bray's (1990) description of the rescue personality, it was hypothesised that firefighter recruits, as compared to community controls, would report lower levels of openness to experience. This hypothesis is supported by the current study, with firefighter recruits reporting scores significantly lower in the openness to experience subscale of the NEO-FFI than controls.

The finding that firefighter recruits are less open to experience accords with a report by Fannin and Dabbs Jr. (2003), who found that low openness predicts the choice to pursue fire service membership over emergency medical services. Contrary to this finding, a study of career firefighters—who were sampled from the same fire department sampled in the current study—

reported that firefighters do not differ from controls in terms of openness to experience (Wagner et al., 2009). A 2010 study also found no significant difference between firefighter recruits and police recruits by the openness to experience scale of the Revised NEO Personality Inventory (NEO-PI-R), though no comparison was made to non-rescuer controls (Salters-Pedneault et al., 2010).

People who are more open to experience are typically more likely to prefer variety, be intellectually curious, have an active imagination, and be independent in their judgements (Costa & McCrae, 1992). Based on these characteristics, previous studies have hypothesised a link between openness to experience and the development of PTSD. One study of civilians involved in traffic accidents found that low openness to experience, in combination with low extroversion and agreeableness, predicts the later development of PTSD (Nightingale & Williams, 2000). Contrary to this finding, a study of war veterans found that openness to experience is not associated with the severity of PTSD symptomatology, and that neuroticism is a better predictor of PTSD severity (Hyer et al., 2003). Despite the disagreement in the literature over the involvement of characteristic openness to experience in PTSD development and severity, there is evidence suggesting that greater levels of openness are associated with increased posttraumatic growth in emergency service personnel (Shakespeare-Finch, Gow, & Smith, 2005). As posttraumatic growth is the positive improvement of one's self after facing posttraumatic stress, firefighter recruits reporting low openness to experience may find it more difficult to achieve personal wellbeing after being faced by a critical incident.

Extroversion, neuroticism, conscientiousness, and Type A behaviour. Also based on Mitchell and Bray's description of the rescue personality, it was hypothesised that firefighter recruits would report higher levels of extroversion, neuroticism, conscientiousness, and Type A

behaviour, as compared to controls. None of these hypotheses is supported by the current study, with firefighter recruit responses not significantly differing from control responses to the neuroticism, extroversion, and conscientiousness subscales of the NEO-FFI. Interestingly, mean scores for Type A behaviour do significantly differ between firefighter recruits and controls. However, this effect is opposite to what was expected, with firefighter recruits reporting significantly lower Type A behaviour than controls.

The finding that firefighter recruits do not differ from controls in terms of neuroticism, extroversion, and conscientiousness both accords and discords with the current literature. In the previously discussed study of career firefighters who were sampled from the same fire department as the recruits of the current study, it was found that firefighters did not differ from the comparison group in terms of neuroticism and conscientiousness. However, these career firefighters were significantly more extroverted than the controls (Wagner et al., 2009). The only study available including firefighter recruits, specifically, failed to include a community control group, making comparisons only to police recruits. In this study, firefighter recruits were found to exhibit lower levels of gregariousness (a subscale of extraversion) and conscientiousness, and did not differ in terms of neuroticism (Salters-Pedneault et al., 2010).

The current study's finding that firefighter recruits report less Type A behaviour than community controls is completely contrary to what is expected based on Mitchell and Bray's (1990) description of the rescue personality. Similar to the current findings, career firefighters working with the same fire department sampled in the current study, were also found to not differ significantly from community controls by reported Type A behaviour (Wagner et al., 2009). As there are no reports of greater Type A behaviour among firefighters in the available literature, there is no evidence to suggest Type A behaviour as part of the "rescue personality."

Sensation seeking and risk perceptions. As reported by Zaleski (1984), another component of the "rescue personality" is sensation seeking and risk taking. As such, it was hypothesised that firefighter recruits would report greater levels of sensation seeking and lower perception of physical risk than comparable controls. Neither of these hypotheses is supported by the current study, with firefighter recruits and community controls not significantly differing by response to the Zuckerman Sensation Seeking Scale or the Physical Risk Assessment Inventory.

When considering firefighter specific data, there is very limited evidence to support sensation seeking and low risk perception as part of the "rescue personality." One of the oldest and most cited studies reporting an association between the firefighting profession and sensation seeking is the aforementioned Zaleski (1984) study. However, this study cannot be generalized specifically to firefighters, as firefighters, mountain rescue squad men, and mine rescue men were all included under the same "Professionals" group during analysis, and then compared to a non-rescue control group (Zaleski, 1984). Beyond the work of Zaleski, the only other available study finding an association between firefighting and sensation seeking was conducted by Gorji et al. (2011). Although firefighters consisted of their own case group in this study, the only controls sampled were municipal clerks—which may not constitute a control sample representative of the general public.

Contrary to the findings of Zaleski and Gorji et al., and consistent with the findings of the current study, Wagner, Martin, and McFee (2009) failed to find any significant difference between career firefighters and non-rescue community controls in terms of sensation seeking or risk perception. This was also the only previous study to include firefighters as their own case group, and construct a control group consisting of men working in multiple different non-rescue fields.

Mental Health and Previous Post-Traumatic Stress

It has previously been reported that career firefighters, as compared to community controls, are more likely to report greater posttraumatic stress symptomatology and other mental health issues, such as hostility, anxiety, interpersonal sensitivity, and psychoticism (Wagner, McFee, & Martin, 2010). Based on these findings, the current study hypothesised that firefighter recruits would report higher levels of posttraumatic stress symptomatology and other mental health issues than comparable controls. None of these hypotheses is supported, with firefighter recruit and community control mean responses not significantly differing across each subscale of the SCL-90-R and IES-R. Interestingly, although mean responses to the IES-R did not differ significantly between groups, control participants were more likely to respond with IES-R scores greater than 33 (OR = 0.14), implying possible PTSD presence. This result contradicts the hypothesised effect, suggesting controls are potentially more severely impacted by previous traumatic exposures than the firefighter recruits.

The findings of the current study are also contrary to the previously mentioned effect observed in career firefighters who reported greater overall PTSD symptomatology and other mental health issues such as interpersonal sensitivity, anxiety, hostility, and psychoticism (Wagner et al., 2010). One possible explanation for this discrepancy is that working in the firefighting service exposes healthy new recruits to critical incidences and other events that compromise their mental wellbeing.

Firefighters are exposed to numerous unpredictable critical incidents throughout their careers, including managing fires, medical emergencies, and even large-scale community disasters (Corneil et al., 1999). It is likely that exposure to one or more of these critical incidents could place a firefighter at greater risk of developing PTSD or another mental health condition.

Supporting this theory, a study comparing the mental health of firefighter recruits to experienced firefighters found experienced firefighters to be exposed to a greater number of critical events than firefighter recruits, especially events involving death of a child, multiple deaths, or violence against another person. It was also found that PTSD symptomatology and depression scores were significantly greater among the experienced firefighters (Regehr et al., 2003).

Given that firefighters are exposed to critical incidents throughout their careers, one might also expect a dose-response relationship to exist with more years of firefighting experience producing a greater likelihood of developing PTSD or another mental health issue. However, years of firefighting experience alone are not significantly related to PTSD symptomatology or any other mental health measure reported in the literature (depression, somatization, obsessive-compulsive disorder, interpersonal sensitivity, anxiety, hostility, phobic anxiety, paranoia, psychoticism, or alexithymia) (Chamberlin & Green, 2010; Heinrichs et al., 2005; Wagner et al., 2010). Interestingly, once baseline self-efficacy and hostility scores are accounted for, a dose-response relationship does become more apparent, with those firefighters who report greater hostility and lower self-efficacy during recruitment also reporting increasing levels of PTSD symptomatology, depression, and anxiety throughout their first year working in the profession. Conversely, those firefighters who report lower baseline hostility and greater self-efficacy during recruitment were more likely to continue reporting low PTSD symptomatology, depression, and anxiety throughout their first year of service (Heinrichs et al., 2005). This finding underscores the importance of considering the environment in which firefighters work, as well as the individual differences between firefighters—especially in terms of self-efficacy and hostility—when determining the risk of developing any mental health issue, including PTSD.

Satisfaction with Life, Coping, and Emotional Intelligence

Emotional intelligence—the ability to recognise and control the emotions of oneself and to recognize and assess the emotions of others—and proactive coping—actions taken in advance of an event in an attempt to mitigate its impact—both negatively predict mental health issues in firefighters. Emotional intelligence negatively predicts PTSD symptomatology, and proactive coping negatively predicts depression, anxiety, and obsessive-compulsive symptoms (Chamberlin & Green, 2010; Wagner & Martin, 2012). General satisfaction with life is also associated with reduced stress, and greater overall health (Donovan & Halpern, 2002).

Based on these findings, it was hypothesised that firefighter recruits would differ from community controls in terms of proactive coping, emotional intelligence, and life satisfaction. However, the current study fails to support any of these hypotheses, as firefighter recruit and control mean responses to the Proactive Coping Inventory, Satisfaction With Life Scale, and Emotional Intelligence Scale did not significantly differ. This finding has few practical implications until reports are made available comparing career firefighters and non-rescue controls in terms of proactive coping, life satisfaction, and emotional intelligence. Until then, inferences cannot be drawn regarding the influence that firefighting service has over these variables.

Limitations

The present study faces several limitations, including the small sample size of firefighter recruits (n = 22). The most obvious solution to this limitation is to simply increase the number of firefighter recruits sampled. However, since firefighters are only recruited as they are needed by the fire department, this is not an easy limitation to overcome. By waiting for more firefighters to be recruited, there is a possibility that the firefighters recruited in 2005 could differ across

relevant variables as compared to firefighters recruited in more recent years. Since data collection had already been stretched over eight years, waiting for more firefighter recruits could have hampered the generalizability of the study.

Instead of waiting for more firefighters to be recruited, this study attempted to mitigate this small sample size limitation by utilizing epidemiology methods to assist in data analysis and to individually match controls to firefighter recruits in terms of age, gender, ethnicity, education, and marital status. A modified Wald test (May & Johnson, 1997) was also used to assess the significance of the resulting paired odds ratios in order to maintain strong validity and power when working with the small sample.

Although the use of dichotomisation and odds ratio calculations does work to alleviate some of the issues associated with the small sample size, the use of epidemiological methods does introduce another limitation to the current study. This limitation stems from the dichotomisation of the continuous variables through a median split. Cohen (1983) reports that dichotomisation can result in a loss of between one-fifth and two-thirds of the variance present in the continuous variable, and that this loss of variance can limit the power of the measure. The current study accounted for this loss by conducting statistical analysis alongside the epidemiological analysis, preserving the continuous variable for one-way ANOVA. In all cases where a median split was used to dichotomise the variables, the results of the one-way ANOVA accorded with the odds ratios.

Beyond the sample size and data analysis methods used, the current study is also limited by the use of self-report data. Without objective measures to supplement the self-report data, it is impossible to determine if social desirability or another bias influenced participant reporting. On multiple occasions, both firefighter recruit and control participants expressed concern over the

confidentiality of their responses. Although participants were assured that their responses were kept strictly confidential, these concerns may have altered the way participants responded to the questionnaires. However, since both firefighter recruits and controls expressed these concerns, it is presumed that this bias was present in both groups—effectively limiting the influence of this bias over the final results.

Another limitation of the current study is that firefighter recruits were sampled over an eight year period between 2005 and 2013, whereas the control sample was only constructed in a one month period at the end of 2013. Since controls were individually matched to the age of the firefighter recruits at the time they completed the questionnaires, few of the matched controls are actually the same age as the firefighter to whom they were matched. For example, if a firefighter recruit was sampled in 2005 and was 22 years of age at the time, the control matched to them would be 22 years old when sampled in the year 2013—even though the firefighter is 30 in 2013. Although this method of matching does control for age effects, it does not necessarily account for cohort effects, as a 22 year old in 2005 may not be comparable to a 22 year old in 2013. However, these cohort effects are likely limited as analysis of the NEO-PI-R subscales used in the Baltimore Longitudinal Study of Aging revealed only modest secular trends across the study duration, with responses to the trust subscale decreasing, and assertiveness and competence subscales increasing as the study progressed. Secular trends were not found for any other subscale of the NEO-PI-R (Terracciano, McCrae, Brant, & Costa, 2005). Future studies can account for cohort effects as well as age effects by utilizing a nested case-control design, where a matched control participant is sampled at the same time or soon after a firefighter recruit is sampled.

Other limitations in the present study limit its generalizability. Over the eight years of sampling, only Caucasian males were recruited to the partner fire department, and therefore included in the study. As such, the findings of the current study are not generalizable to female firefighter recruits and populations that are more culturally diverse.

It should also be noted that the firefighter recruits sampled in the current study represent firefighters who have been successfully recruited to a professional firefighting position, as unsuccessful applicants were not included in the study. It is possible that these successful firefighter recruits may differ from the unsuccessful applicants in one or more of the variables included in the current study. Therefore, this study can only be generalized to successful firefighter recruits, and not to the entire population of people wishing to pursue a career in the firefighting profession.

Conclusions and Recommendations

Compared to the literature available, the present study is the first to investigate the "rescue personality" as a predispositional factor to joining the firefighting service. Assuming Mitchell and Bray's (1990) description of the "rescue personality" as predispositional, it was expected that firefighter recruits without previous firefighting experience would be more action oriented, thrill seeking, socially conservative, dedicated, and driven to a high standard of performance than the average non-rescue person in the community. However, the only finding supporting the theory of the "rescue personality" as a predispositional factor is that firefighter recruits in the current study were less open to experience than non-rescue controls. None of the other variables examined in the current study were found to be consistent with the "rescue personality." Furthermore, firefighter recruits in the current study were found to report less Type A behaviours and were less likely to report posttraumatic stress symptomatology characteristic of

PTSD as compared to the non-rescue controls—results contradictory to those expected following the "rescue personality."

Based on the findings of the current study, there is no evidence to support the "rescue personality" as a predispositional factor to joining the firefighting service. However, due to the limited sample size and difficulties generalizing these findings to the firefighting profession as a whole, more studies are needed investigating the predispositional nature of the rescue personality. These studies should make efforts to include a larger and more diverse sample of firefighter recruits, representing the different ethnicities and genders representative of the firefighting population. They should be either structured like the present study using a cross-sectional approach comparing firefighter recruits to non-rescue controls, or as a longitudinal study with firefighter recruits sampled again after experience working in the profession. However, if a longitudinal design were to be used, a comparable non-rescue control group should also be sampled to serve as comparison to the recruit and career firefighter responses. Previous studies have failed to include such a control group.

The present study also fits within a larger section of the literature questioning the validity of the "rescue personality" as a concept altogether. Although some studies investigating emergency service personnel have reported findings consistent with the "rescue personality," a growing number of studies has failed to find such an effect. Other studies have also failed to find consistency in personality profiles between firefighters, paramedics, and police officers, providing evidence against the universality of the "rescue personality."

As the present study only investigates the predispositional nature of the "rescue personality," these findings should not be interpreted as discrediting the validity of the "rescue

personality" as a whole. Rather, it should be interpreted as a description of just one aspect of the "rescue personality."

Future studies investigating the legitimacy of the "rescue personality" should follow the longitudinal design described above, sampling both firefighter recruits and controls, and following-up with both sample populations after the firefighter recruits have worked in the profession for at least a couple years. The present study could also be expanded to further investigate the legitimacy of the "rescue personality" by retesting the original firefighter recruits with the same questionnaire packages.

Until more literature becomes available investigating the validity of the "rescue personality," policy makers and researchers should exercise extreme caution when using the "rescue personality" as a generalization to the firefighting population—especially to firefighter recruits.

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